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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 08/27/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/030,424	Applicant(s) YONEDA ET AL.	
	Examiner Lynette T. Umez-Eronini	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-27 is/are pending in the application.
- 4a) Of the above claim(s) 9, 10 and 14-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 11-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 9, 10 and 14-27 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of claim 1-7 and 11-13 in Paper No. 8 is acknowledged. The traversal is on the ground(s) that the election is improper for failing to provide reasons and or examples to support a conclusion of patentable distinctness between the polishing liquid composition of Group I and the polishing method of Group II. This is not found persuasive because claims 1-7, which are drawn to a composition and claims 8-10, which are drawn to a polishing method are distinct inventions that require separate classification. Because these inventions are distinct the product (polishing liquid composition) can be used in a materially different polishing process that does not require using a polishing liquid.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 3, 7, and 11 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Avanzino et al. (US 5,916,855).

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Avanzino teaches, "A polishing slurry composition for planarization of silicon semiconductor wafers . . . , . . . for polishing a wafer having tungsten lines over titanium or titanium nitride layers, and having tungsten filled vias through silicon dioxide dielectric layers, . . ." (column 1, lines 16-23). Avanzino further teaches, ". . . a tungsten slurry comprising abrasive particles . . . , one or more oxidizing or complexing agents, and a suspension agent, . . ." (column 3, lines 63-67). "The preferred oxidizer is a ferric salt, . . . consisting of $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ (same as applicant's etching agent and oxidizing agent), . . ." (column 4, lines 26-28). "The suspension agent used . . . under the trade name EVERFLO, . . . , . . . might be formulated from the following classes of surfactants: 1) glycols such as ethylene glycol, propylene glycol (same as applicant's formula (I) in the present claim 1); . . ." (column 4, lines 29-45). Avanzino also teaches, "D.I. water: 65% of total slurry volume" (column 5, lines 26). "These slurries were prepared using an aqueous alumina suspension, EVERFLO White suspension agent, and the oxidizing agents and/or complexing agents. . . . Other acceptable Ti polishing agents, include citric acid (same as applicant's organic acid and etching agent), ceric ammonium nitrate, potassium iodate, and hydrogen peroxide (same as applicant's oxidizing agent)" (column 8, lines 12-36), The above reads on,

A polishing liquid composition for polishing a surface to be polished comprising an insulating layer and a metal layer, the polishing liquid composition comprising:

a compound having a structure in which each of two or more adjacent carbon atoms has a hydroxyl group in a molecule, and water, wherein the compound had a structure represented by formula (I) as recited in **claim 1**;

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an organic acid, **in claim 2**;

the organic acid is an etching agent, **in claim 3**; and

an oxidizing agent, an abrasive or a mixture thereof, **in claims 7 and 11**;

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avanzino (US '855) as applied to claim 1 above, and further in view of Kaufman et al. (US 5,783,489).

Avanzino differs in failing to teach the polishing composition further comprises an etching agent comprising an inorganic acid, **in claim 4**.

Kaufman teaches, "Other well known polishing slurry additive may be incorporated into the chemical mechanical polishing slurry of this invention. . . . One type of optional additives are inorganic acids . . . which may be added to the polishing slurry to further improve or enhance the polishing rate of the barrier layer in the wafer. Useful inorganic additives include sulfuric acid, phosphoric acid, nitric acid (same as applicant's inorganic etching agents) . . ." (column 6, lines 29-38).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Avanzino by using Kaufman's method of incorporating an inorganic etching agent to a polishing slurry for the purpose of improving or enhancing the polishing rate of the barrier layer in the wafer (Kaufman '489, column 6, lines 31-35).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 5 and 12 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Kaufman (US '489).

In Kaufman's Description of the Art, "In a typical process, via holes are etched through an interlevel dielectric (ILD) to interconnection lines . . . Next, a thin adhesion layer . . . is generally formed over the ILD and is directed into the etched via hole.

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Deposition is continued until the via hole is filled with the blanket deposited metal. Finally, the excess metal is removed by chemical mechanical polishing, (CMP) to form metal vias" (column 1, lines 49-54 and 56-59). Kaufman further teaches, "A chemical mechanical polishing slurry comprising at least two oxidizing agents, an organic acid and an abrasive . . ." (Abstract). "Preferably the organic acid is selected from the group of acetic acid (same as applicant's organic etching acid), . . . lauric acid, . . . myristic acid, . . . palmitic acid, . . . stearic acid (same as applicant's aliphatic carboxylic acid having 7 to 24 carbon atoms), . . ." (column 6, lines 7-14). "The CMP slurry may be produced using techniques known to those skilled in the art. Typically, the oxidizing agent and any optional additives, are mixed into the aqueous medium, such as deionized or distilled water, . . ." (column 7, lines 55-61). The aforementioned reads on,

A polishing liquid composition for polishing a surface to be polished comprising an insulating layer and a metal layer, the polishing liquid composition comprising:

an aliphatic carboxylic acid having 7 to 24 carbon atoms, an etching agent comprising an organic acid, and water, **in claim 5**; and

an oxidizing agent, an abrasive or a mixture thereof, **in claim 12**.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claim 6 and 13 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Kaufman et al. (US 6,063,306).

In Kaufman's Description of the Art, "In a typical process, via holes are etched through an interlevel dielectric (ILD) to interconnection lines . . . Next, a thin adhesion layer . . . is generally formed over the ILD and is directed into the etched via hole. Deposition is continued until the via hole is filled with the blanket deposited metal. Finally, the excess metal is removed by chemical mechanical polishing, (CMP) to form metal vias" (column 1, lines 55-65). Kaufman further teaches, ". . . a first aqueous chemical mechanical polishing slurry comprising at least one abrasive, at least one oxidizing agent, at least one complexing agent and at least one organic amino compound . . ." (column 1, lines 10-12). "Useful complexing agents include but about are not limited to acids such as citric, acetic, oxalic and other acids, as well as amino acid . . . phosphoric acids (same as applicant's etching agent), . . . A preferred complexing agent is acetic acid" (column 8, lines 11-16). "Preferred organic amino compounds are long chain alkylamines and alcoholamines. . . for example, nonylamine and dodecylamine (same as applicant's formula (II), in the present claim 6) . . . " (column 6, lines 9-18). "A preferred oxidizing agent is hydrogen peroxide" (column 8, lines 1-2). The aforementioned reads on,

A polishing liquid composition for polishing a surface to be polished comprising an insulating layer and a metal layer, the polishing liquid composition comprising: an

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amine compound represented by formula (II) as recited in claim 6, an etching agent, an oxidizing agent, and water, **in claim 6**; and an oxidizing agent, an abrasive or a mixture thereof, **in claim 13**.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Lynette T. Umez-Eronini
ltue

August 22, 2002